1. A superconducting coil assembly for mounting to a portion of a rotor assembly of an electric rotating machine, the superconducting coil assembly, in operation, maintained at cryogenic temperatures and the portion of the rotor assembly, in operation, being maintained above cryogenic temperatures, the superconducting coil assembly comprising:

at least one superconducting winding wound about a longitudinal axis of the coil assembly and having an inner radial surface defining a bore extending through the coil assembly, said at least one superconducting winding configured to be mounted to the portion of the rotor assembly; and

at least one support member extending across the bore and mechanically coupled to the portion of the rotor assembly and to opposing portions of the inner radial surface of the at least one superconducting winding.

2. The superconducting coil assembly of claim 1 wherein the at least one support member includes a broad planar surface in a plane substantially transverse to the at least one superconducting winding.

3. The superconducting coil assembly of claim 2 wherein the at least one support member is formed of a thermally insulative material.

4. The superconducting coil assembly of claim 3 wherein the thermally insulative material is a epoxy glass reinforced molding compound.

5. The superconducting coil assembly of claim 4 wherein the plurality of superconducting windings are non-circular in shape.

6. The superconducting coil assembly of claim 5 wherein the non-circular shape is a racetrack shape having a pair of opposing arcuate end sections and a pair of opposing substantially straight side sections, the at least one support member mechanically coupled to

the pair of opposing substantially straight side sections of the at least one superconducting winding.

7. The superconducting coil assembly of claim 4 wherein the at least one support member is formed of a thermally insulative material.

8. The superconducting coil assembly of claim 7 wherein the thermally insulative material is a epoxy glass reinforced molding compound.

9. The superconducting coil assembly of claim 4 wherein the plurality of superconducting windings are non-circular in shape.

10. The superconducting coil assembly of claim 9 wherein the non-circular shape is a racetrack shape defining a pair of opposing arcuate end sections and a pair of opposing substantially straight side sections, the at least one support member mechanically coupled to the pair of opposing substantially straight side sections of the at least one superconducting winding.

11. The superconducting coil assembly of claim 2 wherein the portion of the rotor assembly has a concave surface and the at least one support member includes a rounded member sized and shaped to be received with the concave surface of the portion of the rotor assembly.

12. The superconducting coil assembly of claim 1 wherein the at least one support member includes a broad planar surface in a plane substantially parallel with the at least one superconducting winding.

13. The superconducting coil assembly of claim 12 wherein the at least one support member is formed of a thermally insulative material.

14. The superconducting coil assembly of claim 13 wherein the thermally insulative material is a epoxy glass reinforced molding compound.

15. The superconducting coil assembly of claim 12 wherein the plurality of superconducting windings are non-circular in shape.

16. The superconducting coil assembly of claim 15 wherein the non-circular shape is a racetrack shape defining a pair of opposing arcuate end sections and a pair of opposing substantially straight side sections, the at least one support member mechanically coupled to the pair of opposing substantially straight side sections of the at least one superconducting winding.

17. The superconducting coil assembly of claim 12 wherein the portion of the rotor assembly has a concave surface and the at least one support member includes a rounded member sized and shaped to be received with the concave surface of the portion of the rotor assembly.

18. A support assembly for a superconducting coil assembly, the support assembly comprising:

a support member having an outer wall surrounding the superconducting coil assembly; and

a wedge having a first surface, attached to the outer wall of the support member.

19. The support assembly of claim 18 wherein the wedge has a triangular shape.

20. The support assembly of claim 18wherein the superconducting coil assembly includes a plurality of windings including superconductor, the support member being formed of a material having a thermal expansion characteristic substantially the same as a thermal expansion characteristic of the superconductor.

21. The support assembly of claim 20 wherein the support member is formed of stainless steel.

22. The support assembly of claim 20 wherein the support member includes a plurality of support plates extending from the outer wall, each support plates positioned between adjacent ones of the plurality of windings.

23. A rotor assembly comprising:

a rotor body;

a plurality of superconducting coil assemblies angularly spaced about the periphery of the rotor body;

a plurality of support members, associated with a corresponding one of the superconducting coil assemblies; and a plurality of wedges, each positioned between adjacent ones of the support members.

24. The rotor assembly of claim 23 wherein each support member includes an outer wall surrounding a corresponding one of the superconducting coil assemblies; and

each wedge has a first surface, attached to the outer wall of the support member.

25. The rotor assembly of claim 24 wherein each wedge has a triangular shape.

26. The support assembly of claim 23 wherein each superconducting coil assembly includes a plurality of windings having superconductor, each support member being formed of a material having a thermal expansion characteristic substantially the same as a thermal expansion characteristic of the superconductor.

27. The support assembly of claim 26 wherein each support member is formed of stainless steel.

28. The support assembly of claim 26 wherein each support member includes a plurality of support plates extending from the outer wall, each support plate positioned between adjacent ones of the plurality of windings.